

DUAL MEASUREMENT SYSTEM



INTERPRETATIONS

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DUAL MEASUREMENT SYSTEM (46 CFR 69 SUBPART D)

69.151 PURPOSE

This subpart prescribes measurement requirements for the assignment of either one gross and one net tonnage or two gross and two net tonnages to vessels under the Dual Measurement System.

69.153 APPLICATION OF OTHER LAWS

(a) *USE OF HIGHER TONNAGE*

If a vessel is assigned two gross tonnages under §69.175(b), the higher gross tonnage is the tonnage used when applying inspection, manning, and load line laws and regulations to the vessel.

(b) *LOAD LINE REQUIREMENTS*

Tonnage marks are not to be construed as additional load line marks. Whether or not a tonnage mark is submerged under §69.171 has no effect on the applicability of load line laws and regulations.

69.155 MEASUREMENT REQUIREMENTS

Except as otherwise required by this subpart, the measurement requirements under the Standard Measurement System in subpart C of this part apply to the measurement of vessels under the Dual Measurement System.

69.157 DEFINITIONS

Terms used in this subpart that are defined in §69.103 have the same meaning as in §69.103, except the terms listed below. As used in this subpart,—

GROSS TONNAGE is defined in §69.161(a).

LINE FOR FRESH AND TROPICAL WATERS means the line described in §69.177(b)(2).

LINE OF THE SECOND DECK means the line described in §69.181.

LINE OF THE UPPERMOST COMPLETE DECK means a longitudinal line at the underside of the uppermost complete deck or, if that deck is stepped, the longitudinal line of the underside of the lowest portion of that deck parallel with the upper portions of that deck.

NET TONNAGE is defined in §69.161(b).

SECOND DECK means the next deck below the uppermost complete deck that meets the following:

- (a) Is continuous athwartships and in a fore-and-aft direction at least between peak bulkheads, even though the deck may have interruptions or openings due to propelling machinery spaces, to hatch and ventilation trunks not extending longitudinally completely between main transverse bulkheads, to ladder and stairway openings, to chain lockers, or to cofferdams.
- (b) Is fitted as an integral and permanent part of the vessel.
- (c) Has proper covers to all main hatchways.
- (d) Does not have steps the total of which exceed 48 inches in height.

TONNAGE DECK means, for a vessel with only one deck, the uppermost complete deck and, for a vessel with a second deck, the second deck.

TONNAGE MARK means the line described in §69.177(a)(2).

69.159 APPLICATION FOR MEASUREMENT SERVICES

Applications for measurement services under this subpart must include the application information and plans required for the Standard Measurement System under §69.105. The application must indicate whether a line for fresh and tropical waters is requested under §69.177(b) and, for vessels with more than one deck, indicate whether one or two sets of tonnages are desired under §69.175.

69.161 GROSS AND NET TONNAGES

(a) Gross tonnage means the tonnage of a vessel, less certain spaces exempt under §69.169, and is the sum of the following:

- (1) Under-deck tonnage (§69.163)
- (2) Between-deck tonnage (§69.165)
- (3) Superstructure tonnage (§69.167)
- (4) Excess hatchway tonnage (§69.115)
- (5) Tonnage of framed-in propelling machinery spaces included in calculating gross tonnage (§69.121(d)(1)).

(b) Net tonnage means gross tonnage less deductions under §69.119 and §69.121.

69.163 UNDER-DECK TONNAGE

The under-deck tonnage provisions in §69.109 apply; except that, under the Dual Measurement System, spaces between the line of the tonnage deck and the tonnage deck itself due to a stepped tonnage deck are included in under-deck tonnage.

69.165 BETWEEN-DECK TONNAGE

The between-deck tonnage provisions in §69.111 apply; except that, under the Dual Measurement System, between-deck space extends from the tonnage deck to the uppermost complete deck, rather than from the line of the tonnage deck to the line of the uppermost complete deck.

69.167 SUPERSTRUCTURE TONNAGE

The superstructure tonnage provisions in §69.113 apply; except that, under the Dual Measurement System, spaces between the line of the uppermost complete deck and the uppermost complete deck itself due to a stepped uppermost complete deck are not included in the superstructure tonnage.

69.169 SPACES EXEMPT FROM INCLUSION IN GROSS TONNAGE

The tonnage of the following spaces is exempt from inclusion in gross tonnage:

- (a) **MISCELLANEOUS EXEMPTIBLE SUPERSTRUCTURE SPACES**
Spaces listed in §69.117(b) when located within the superstructure.

69.171 When the Tonnage Mark is Considered Submerged**(b) *PASSENGER SPACES***

Spaces listed in §69.117(c)(1) through (c)(3) when located above, but not on, the uppermost complete deck.

(c) *WATER BALLAST SPACES*

Spaces listed in §69.117(f), regardless of location.

(d) *DRY CARGO AND STORES SPACES*

Spaces available for carrying dry cargo and stores when located on or above the uppermost complete deck.

(e) *ADDITIONAL EXEMPTIONS FOR LOW TONNAGE*

When a vessel is assigned a tonnage mark and the tonnage mark is not submerged,—

(1) *Miscellaneous Exemptible Spaces* Spaces listed in §69.117(b) when located between the uppermost complete deck and the second deck;

(2) *Passenger Spaces on the Uppermost Complete Deck* Spaces listed in §69.117(c)(1) through (c)(3) when located on the uppermost complete deck; and

(3) *Dry Cargo and Stores Spaces* Spaces available for carrying dry cargo and stores when located between the uppermost complete deck and the second deck.

69.171 WHEN THE TONNAGE MARK IS CONSIDERED SUBMERGED

For the purpose of this subpart, a tonnage mark is considered submerged when—

(a) In salt or brackish water, the upper edge of the tonnage mark is submerged; and

(b) In fresh or tropical water, the upper edge of the line for fresh and tropical waters is submerged.

69.173 TONNAGE ASSIGNMENTS FOR VESSELS WITH ONLY ONE DECK

A vessel without a second deck is assigned only one gross and one net tonnage. In calculating the gross tonnage, only the exemptions in §69.169 (a) through (d) are allowed. Markings under §69.177 are not permitted on these vessels.

69.175 TONNAGE ASSIGNMENTS FOR VESSELS WITH A SECOND DECK**(a) *GENERAL***

At the option of the vessel owner, a vessel having a second deck is assigned either: 1) two gross and two net tonnages; or 2) one gross and one net tonnage *corresponding to the lower gross and net tonnage*.

(b) *HIGH / LOW TONNAGES ASSIGNED*

If two gross and two net tonnages are assigned, the higher tonnages (i.e. those based only on exemptions under §69.169 (a) through (d)) are applicable when the upper edge of the tonnage mark is submerged and the lower tonnages (i.e. those based only on all exemptions under §69.169) are applicable when the upper edge of the tonnage mark is not submerged.

(c) ONLY LOW TONNAGES ASSIGNED

If only the low gross and low net tonnages, as calculated under paragraph (b) of this section, are assigned, these tonnages are applicable at all times. On these vessels, *a load line must be assigned at a level below the line of the second deck, and the tonnage mark must be located in accordance with §69.177(a)(6) at the level of the uppermost part of the load line grid.*

69.177 MARKINGS

The following table provides an overview of the marking requirements of this section:

GENERAL TONNAGE MARKING REQUIREMENTS		
	Load Line Assigned	Load Line Not Assigned
<u>Two Deck Vessel</u>		
HIGH AND LOW TONNAGES	Must have tonnage mark with triangle	Must have tonnage mark with triangle, and freeboard deck mark
LOW TONNAGES ONLY	Must have tonnage mark with triangle	Ineligible for measurement under Dual Measurement System
<u>One Deck Vessel</u>	No tonnage markings on hull	No tonnage markings on hull

(a) TONNAGE MARK

- (1) **General** All vessels with a second deck that are measured under the Dual Measurement System must have, on each side of the vessel, a tonnage mark, and an inverted triangle identifying the tonnage mark, as described and located under this section. (See the figure in §69.183(a).) Vessels with only one deck are not assigned markings under this section.
- (2) **Tonnage Mark Characteristics** The tonnage mark is a horizontal line 15 inches long and one inch wide. The tonnage mark must be designated by a welded bead or other permanent mark 15 inches long placed along the top edge of the tonnage mark.
- (3) **Inverted Triangle Characteristics** Above the tonnage mark is placed an inverted equilateral triangle, each side of which is 12 inches long and one inch wide, with its apex touching the upper edge of the center of the tonnage mark.
- (4) **Longitudinal Placement** If the vessel has a load line mark, the longitudinal location of the center of the tonnage mark must be between 21 inches and six feet six inches aft of the vertical centerline of the load line ring. (See the figures in §69.183 (b) and (c).) If the vessel does not have a load line mark, the center of the tonnage mark must be located amidships.
- (5) **Vertical Placement (High / Low Tonnages Assigned)** Except as under paragraph (a)(6) of this section, the upper edge of the tonnage mark must be located below the line of the second deck at the distance indicated in Table 69.177(a)(5). (See the figure in §69.183(b).)

TABLE 69.177(a)(5)—MINIMUM DISTANCE IN INCHES BETWEEN THE TONNAGE MARK AND THE LINE OF THE SECOND DECK

L (in feet)	L divided by D									
	12	13	14	15	16	17	18	19	20	
220 and under	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
230	3.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
240	4.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
250	6.3	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260	8.0	4.8	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270	9.9	6.4	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
280	11.8	8.1	4.9	2.1	2.0	2.0	2.0	2.0	2.0	2.0
290	13.9	9.9	6.5	3.5	2.0	2.0	2.0	2.0	2.0	2.0
300	16.0	11.7	8.1	4.9	2.1	2.0	2.0	2.0	2.0	2.0
310	18.3	13.7	9.8	6.4	3.5	2.0	2.0	2.0	2.0	2.0
320	20.7	15.8	11.7	8.1	4.9	2.1	2.0	2.0	2.0	2.0
330	23.2	18.0	13.6	9.8	6.4	3.5	2.0	2.0	2.0	2.0
340	25.9	20.4	15.7	11.6	8.1	4.9	2.1	2.0	2.0	2.0
350	28.7	22.9	17.9	13.6	9.8	6.5	3.6	2.0	2.0	2.0
360	31.7	25.5	20.2	15.7	11.7	8.2	5.0	2.2	2.0	2.0
370	34.7	28.3	22.7	17.9	13.6	9.9	6.6	3.7	2.0	2.0
380	38.0	31.1	25.3	20.2	15.7	11.8	8.3	5.2	2.4	2.4
390	41.3	34.1	27.9	22.6	17.9	13.8	10.1	6.8	3.8	3.8
400	44.8	37.2	30.7	25.0	20.1	15.8	11.9	8.4	5.3	5.3
410	48.2	40.3	33.5	27.7	22.6	18.1	14.0	10.4	7.2	7.2
420	51.5	43.4	36.4	30.4	25.2	20.6	16.4	12.7	9.7	9.7
430	54.8	46.5	39.4	33.3	27.9	23.2	19.0	15.2	11.8	11.8
440	58.4	49.9	42.6	36.4	30.9	26.0	21.7	17.8	14.4	14.4
450	62.1	53.4	46.0	39.6	33.9	29.0	24.6	20.6	17.1	17.1
460	65.9	57.0	49.5	42.9	37.1	32.1	27.6	23.5	19.9	19.9
470	69.8	60.7	53.0	46.3	40.4	35.2	30.6	26.5	22.8	22.8
480	73.7	64.4	56.5	49.7	43.7	38.4	33.7	29.5	25.7	25.7
490	77.5	68.1	60.0	53.0	46.9	41.5	36.7	32.4	28.5	28.5
500	81.2	71.6	63.4	56.2	50.0	44.5	39.6	35.2	31.2	31.2
510	84.9	75.1	66.7	59.4	53.0	47.4	42.4	37.9	33.9	33.9
520	88.4	78.4	69.9	62.4	55.9	50.2	45.1	40.5	36.4	36.4
530	91.8	81.6	72.9	65.3	58.7	52.9	47.7	43.0	38.8	38.8
540	95.2	84.8	75.9	68.1	61.4	55.5	50.2	45.4	41.2	41.2
550	98.4	87.8	78.8	70.9	64.0	58.0	52.6	47.8	43.4	43.4
560	101.6	90.8	81.6	73.6	66.6	60.5	55.0	50.1	45.6	45.6
570	104.8	93.8	84.4	76.3	69.2	62.9	57.3	52.3	47.8	47.8
580	107.9	96.8	87.2	78.9	71.7	65.3	59.6	54.5	49.9	49.9
590	111.0	99.7	90.0	81.5	74.2	67.7	61.9	56.7	52.0	52.0
600	114.0	102.5	92.6	84.0	76.5	69.9	64.0	58.8	54.0	54.0
610	117.0	105.3	95.2	86.5	78.9	72.1	66.2	60.8	56.0	56.0
620	120.0	108.0	97.8	88.9	81.2	74.4	68.3	62.8	58.0	58.0
630	122.9	110.7	100.4	91.3	83.5	76.6	70.4	64.8	59.9	59.9
640	125.7	113.4	102.9	93.7	85.8	78.7	72.4	66.8	61.7	61.7
650	128.6	116.1	105.4	96.1	88.0	80.8	74.4	68.7	63.6	63.6
660	131.4	118.7	107.8	98.3	90.1	82.8	76.3	70.6	65.3	65.3
670	134.2	121.2	110.2	100.6	92.2	84.8	78.3	72.4	67.1	67.1
680	136.9	123.8	112.8	102.9	94.3	86.8	80.2	74.2	68.9	68.9
690	139.6	126.3	115.0	105.1	96.4	88.8	82.1	76.0	70.6	70.6
700	142.3	128.8	117.3	107.3	98.5	90.8	83.9	77.8	72.3	72.3
710	144.9	131.3	119.6	109.4	100.5	92.7	85.7	79.5	73.9	73.9
720	147.5	133.7	121.8	111.5	102.5	94.6	87.5	81.2	75.5	75.5
730	150.1	136.1	124.0	113.6	104.5	96.5	89.3	82.9	77.1	77.1
740	152.7	138.5	126.2	115.7	106.5	98.3	91.5	84.5	78.7	78.7
750	155.3	140.8	128.5	117.8	108.4	100.1	92.8	86.1	80.3	80.3
760	157.8	143.1	130.6	119.7	110.3	101.9	94.4	87.8	81.7	81.7
770	160.2	145.4	132.7	121.7	112.1	103.6	96.0	89.3	83.2	83.2
780	162.6	147.6	134.8	123.7	113.9	105.3	97.6	90.8	84.7	84.7
790	165.1	149.9	136.9	125.6	115.7	107.0	99.2	92.3	86.1	86.1
800	167.5	152.1	138.9	127.4	117.4	108.6	100.8	93.8	87.4	87.4

L=the length in feet of the line of the second deck at the centerline of the vessel from the inner surface of the frames at the vessel's stem to the inner surface of the frames at the vessel's stern.

D=The vertical distance in feet from the top of the flat keel of the vessel to the line of the second deck.

EXAMPLE (1) For a vessel in which L=450 feet and L/D=15 feet, read down from the L/D column "15" and to the right on the column "450" to where the two columns intersect at 39.6. The tonnage mark must be located 39.6 inches below the line of the second deck.

EXAMPLE (2) If L or L/D is an intermediate number, the distance "a" between the tonnage mark and the line of the second deck must be obtained by linear interpolation. For a vessel in which L=424.80 feet and L/D=15.17:

L	Table L/ D=15	Actual L/ D=15.17	Table L/ D=16
Table 420	30.4	25.2
Actual 424.80	r	a	s
Table 430	33.3	27.9

Interpolation:

$$r=30.4+0.48(33.3-30.4)=31.79$$

$$s=25.2+0.48(27.9-25.2)=26.58$$

$$a=r-0.17(r-s)=31.79-0.17(31.79-26.58)=30.89 \text{ inches}$$

(6) **Vertical Placement (Low Tonnage Assigned With Load Line)** For the following vessels, *which meet the criteria of both subsections (i) and (ii) below and* with a load line mark, the upper edge of the tonnage mark must be located at the level of the uppermost part of the load line grid.

(i) Vessels assigned only one gross and one net tonnage under §69.175(c);

(ii) Vessels for which a load line assigning authority certifies that the vessel's load line mark was located as though the second deck were the freeboard deck. *In other words, even if the second deck is not the freeboard deck for load line purposes, the load line must be assigned as if the second deck were the freeboard deck in order for the vessel to be assigned single low tonnages under the Dual Measurement System.*

(b) LINE FOR FRESH AND TROPICAL WATERS

(1) **General** Except as under paragraph (b)(4) of this section, a horizontal line for fresh and tropical waters may be assigned at the vessel owner's request.

(2) **Characteristics of Fresh and Tropical Waters Line** The line must be nine inches long and one inch wide and located above and to the left of the tonnage mark at a distance equal to one forty-eighth of the distance from the top of the flat keel to the tonnage mark. The tonnage mark and the line for fresh and tropical waters must be connected by a vertical line one inch wide. (See the figure in § 69.183(a).)

(3) **Permanent Marking Requirements** The line for fresh and tropical waters must be designated by a welded bead or other permanent mark nine inches long placed along the upper edge of the line.

(4) **Restrictions When Only Low Tonnage is Assigned** For vessels with a load line mark, if the load line assigning authority certifies that the load line mark was located as though the second deck were the freeboard deck, a line for fresh and tropical waters must not be placed on the vessel.

(c) FREEBOARD DECK MARK

A vessel assigned two gross and two net tonnages which has more than one deck and no load line mark assigned must have a mark on each side of the vessel with the same dimensions and location as the freeboard deck line mark under §42.13–20 of this chapter, except that the mark must be located directly above the tonnage mark.

(d) THE LINE OF THE SECOND DECK.

The line of the second deck must not be marked on the side of the vessel. *This prohibition shall not be construed to prohibit the assignment of a freeboard deck line mark under load line requirements at the location of the second deck if the second deck is the actual freeboard deck for purposes of load line assignment.*

(e) COLOR OF MARKINGS

All markings under this section must be maintained in either a light color on a dark background or a dark color on a light background.

69.179 CERTIFICATION OF MARKINGS

(a) MEASUREMENT ORGANIZATION CERTIFICATION

Before a certificate of measurement is issued for a vessel requiring a tonnage mark, a certification by a measurement organization under §69.15 that all markings meet the requirements of this subpart is

required. *As a minimum, this certification should consist of a signed written statement attesting to the following:*

- (1) **Tonnage Mark and Triangle** The tonnage mark and associated inverted triangle are properly installed on both sides of the vessel, with the tonnage mark below the line of the second deck.*
- (2) **Freeboard Deck Mark** For vessels without a load line assigned, the freeboard deck mark is properly installed on both sides of the vessel.*

(b) COAST GUARD VERIFICATION

The Coast Guard, at any time, may verify markings under this subpart.

69.181 LOCATING THE LINE OF THE SECOND DECK

(a) SECOND DECK NOT STEPPED

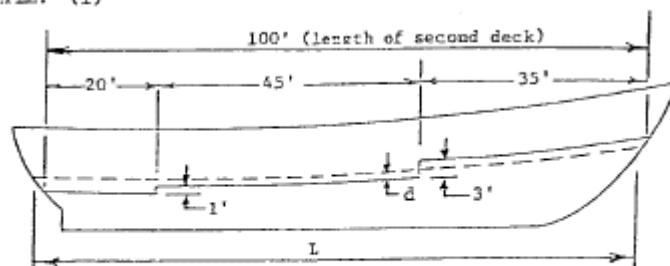
If the second deck is not stepped, the line of the second deck is the longitudinal line of the underside of the second deck at the side of the hull.

(b) SECOND DECK IS STEPPED

If the second deck is stepped (as in the examples following this paragraph), the line of the second deck is a longitudinal line extended parallel to each portion of the second deck and located at the height of the underside of the amidships portion of the second deck at the side of the hull—

- (1) Plus, for each stepped portion of the second deck higher than the second deck at amidships, a distance equal to the length of the stepped portion divided by the total length of the second deck times the height that the step is above the height of the amidship portion of the second deck; and
- (2) Minus, for each stepped portion of the second deck lower than the second deck at amidships, a distance equal to the length of the stepped portion divided by the total length of the second deck times the height that the amidship portion of the second deck is above the height of the step.

EXAMPLE: (1)



L = Length of the line of the second deck.

d = Distance from amidship portion of second deck to line of second deck.

$$d = \frac{35 \times 3}{100} - \frac{20 \times 1}{100} = + 0.85 \text{ feet.}$$

The diagram shows a cross-section of a ship's hull. The top horizontal line represents the second deck, with a total length of 100'. Below this, the hull's profile is shown with a dashed line representing the waterline. Key dimensions are marked: horizontal distances of 20', 18', 27', and 35' from the bow to the centers of buoyancy at different draft levels; and vertical distances of 4', 1', and 1.50' from the bottom to the waterline at those same points. The total length of the hull is labeled 'L'.

$$d = \frac{20 \times 3}{100} + \frac{35 \times 1.5}{100} - \frac{18 \times 1}{100} = +0.945 \text{ feet.}$$

(a) TONNAGE MARK AND TRIANGLE

(b) TONNAGE MARK LOCATION (High and Low Tonnages)

[illegible]

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(c) TONNAGE MARK LOCATION (Low Tonnages Only)

Tonnage mark location if the load line mark is placed as though the second deck were the freeboard deck. In other words, although the second deck does not qualify as the freeboard deck for load line purposes, the load line mark is located by the load line assigning authority as if the second deck qualifies as the freeboard deck. In this figure, the freeboard deck for load line purposes is the uppermost complete deck, and the freeboard deck line mark is correctly shown at the level of the uppermost complete deck.

